

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International publication date
17 June 2004 (17.06.2004)

PCT

(10) International publication number
WO 2004/050789 A1

- (51) International patent classification⁷:
B01D 53/047, 53/26, C01B 3/56, 13/02
- (21) International application number: PCT/FR2003/003463
- (22) International filing date: 24 November 2003 (24.11.2003)
- (25) Language of filing: French
- (26) Language of publication: French
- (30) Data relating to the priority:
02/14,888 27 November 2002 (27.11.2002) FR
- (71) Applicant (for all designated States except US): CENTRE
NATIONAL DE LA RECHERCHE SCIENTIFIQUE
[FR/FR]; 3, rue Michel-Ange, F-75016 PARIS (FR).
- (72) Inventors; and
- (75) Inventors/Applicants (US only): PY, Xavier [FR/FR]; 9, rue
Arnaud de la Tour, F-66200 LATOUR BAS ELNE (FR).
GOETZ, Vincent [FR/FR]; 10, avenue de la Canteranne, F-
66450 POLLESTRES (FR).
- (74) Representatives: SUEUR, Yvette, et al; Cabinet Sucur &
L'Helgoualch, 109, boulevard Haussmann, F-75008 Paris
(FR).

C09K 5/06;

(81) Designated states (national): AE, AG, AL, AM, AT,
AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES,
FI, GB, GD, GE, GH, GM, HR, HU, IL, IN, IS, JP,
KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV,
MA, MD, MG, MK, MN, MW, MX, MY, NI, NO, NZ,
OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK,
SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,
VC, VN, YU, ZA, ZM, ZW.

(84) Designated states (regional): ARIPO patent (BW, GH,
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU,
TJ, TM), European patent (AT, BE, BG, CH, CY, CZ,
DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU,
MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF,
BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE,
SN, TD, TG).

Published:

- with International Search Report
- before the expiration of the time limit for amending
the claims and to be republished in the event of
receipt of amendments

For an explanation of the two-letter codes and the other
abbreviations, reference is made to the explanations
("Guidance Notes on Codes and Abbreviations") at the
beginning of each regular edition of the PCT Gazette.

As printed

(54) Title: COMPOSITE MATERIAL AND USE THEREOF FOR CONTROLLING THERMAL EFFECTS IN A PHYSICO-CHEMICAL PROCESS

(54) Titre : MATERIAU COMPOSITE, SON UTILISATION POUR LA GESTION DES EFFETS THERMIQUES DANS UN PROCESSUS PHYSICO-CHEMIQUE

(57) Abstract: The invention relates to a composite material, a method of controlling the thermal effects generated in a physico-chemical process using the aforementioned material and applications of said material and method. The inventive material comprises an active solid and a phase-change material. The phase-change material takes the form of micronodules having an average dimension of between 1 micrometer and 5 millimetres and said material is selected from materials with a liquid/solid phase change temperature of between -150 °C and 900 °C. The active solid is selected from solids that can be used in a method involving physicochemical processes which can be reversed exothermically in one direction and endothermically in the opposite direction.

(57) Abrégé : L'invention concerne un matériau composite, un procédé de gestion des effets thermiques générés dans un processus physico-chimique utilisant ledit matériau, ainsi que des applications du matériau et du procédé. Le matériau composite est constitué par un solide actif et par un matériau à changement de phase. Le matériau à changement de phase est sous forme de micronodules qui ont une dimension moyenne comprise entre 1 micromètre et 5 millimètres et il est choisi parmi les matériaux dont la température de changement de phase liquide/solide est entre -150 °C et 900 °C. Le solide actif est choisi parmi les solides utilisables dans un procédé mettant en jeu des processus physico-chimiques réversibles exothermiques dans un sens et endothermiques dans le sens contraire.

WO 2004/050789 A1

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/FR 03/03463

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C09K5/06 01D53/047 801D53/26 C01B3/56 C01B13/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C09K B01D C01B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 971 605 A (TARMAN PAUL B) 20 November 1990 (1990-11-20) the whole document	1,2,4,5, 7-11,13, 20,21, 24-26
A	US 6 063 312 A (MANNHEIMER RICHARD J) 16 May 2000 (2000-05-16) claims	1,4,5,13
A	DE 199 54 769 A (REMMERS BAUCHEMIE GMBH) 17 May 2001 (2001-05-17) the whole document	1,4-6,13
A	US 5 861 050 A (PITTEL ALAN ET AL) 19 January 1999 (1999-01-19) claims 1,3,5	1,4,5,7, 8

-/-

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

15 April 2004

Date of mailing of the international search report

22/04/2004

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Puetz, C

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/FR 03/03463

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4971605	A	20-11-1990	DE 4022588 A1 DE 9018175 U1 JP 2008828 C JP 3106437 A JP 7047122 B	28-03-1991 14-05-1998 11-01-1996 07-05-1991 24-05-1995
US 6063312	A	16-05-2000	US 6284158 B1	04-09-2001
DE 19954769	A	17-05-2001	DE 19954769 A1	17-05-2001
US 5861050	A	19-01-1999	NONE	
DE 19630073	A	29-01-1998	DE 19630073 A1 AU 3941197 A DE 59702643 D1 WO 9804644 A1 EP 0914399 A1	29-01-1998 20-02-1998 21-12-2000 05-02-1998 12-05-1999